



457778



**POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION**

I. IDENTIFICATION

01 STATE 26 02 SITE NUMBER 980994404

MID

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site) <u>Allied Paper - Portage Creek - Kalamazoo River</u>		02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER			
03 CITY <u>Kalamazoo to Saugatuck</u>	04 STATE <u>Mi</u>	05 ZIP CODE	06 COUNTY <u>Kalamazoo & Allegan</u>	07 COUNTY CODE <u>077</u>	08 CONG DIST <u>05</u>
09 COORDINATES LATITUDE _____ LONGITUDE _____		10 TYPE OF OWNERSHIP (Check one) <input checked="" type="checkbox"/> A. PRIVATE <input type="checkbox"/> B. FEDERAL <input type="checkbox"/> C. STATE <input type="checkbox"/> D. COUNTY <input type="checkbox"/> E. MUNICIPAL <input type="checkbox"/> F. OTHER _____ <input type="checkbox"/> G. UNKNOWN			

III. INSPECTION INFORMATION

01 DATE OF INSPECTION <u>10.28.86</u> MONTH DAY YEAR	02 SITE STATUS <input checked="" type="checkbox"/> ACTIVE <input type="checkbox"/> INACTIVE	03 YEARS OF OPERATION <u>1925</u> <u>Present</u> _____ UNKNOWN BEGINNING YEAR ENDING YEAR
04 AGENCY PERFORMING INSPECTION (Check all that apply) <input type="checkbox"/> A. EPA <input type="checkbox"/> B. EPA CONTRACTOR _____ (Name of firm) <input checked="" type="checkbox"/> E. STATE <input type="checkbox"/> F. STATE CONTRACTOR _____ (Name of firm) <input type="checkbox"/> C. MUNICIPAL <input type="checkbox"/> D. MUNICIPAL CONTRACTOR _____ (Name of firm) <input type="checkbox"/> G. OTHER _____ (Specify)		

05 CHIEF INSPECTOR <u>George Carpenter</u>	06 TITLE <u>Environmental Quality Analyst</u>	07 ORGANIZATION <u>MDNR</u>	08 TELEPHONE NO. <u>(517) 373-4800</u>
09 OTHER INSPECTORS <u>Cheryl Wallace</u>	10 TITLE <u>Environmental Quality Analyst</u>	11 ORGANIZATION <u>MDNR</u>	12 TELEPHONE NO. <u>(517) 373-4800</u>
			()
			()
			()
			()

13 SITE REPRESENTATIVES INTERVIEWED <u>R. Richard Eaton</u>	14 TITLE <u>Manager</u>	15 ADDRESS <u>Kalamazoo, MI</u>	16 TELEPHONE NO. <u>(616) 345-7131</u>
<u>Martin Smith, Jr.</u>	<u>Manager</u>	<u>Kalamazoo, MI</u>	<u>(616) 345-7131</u>
<u>Jon DeWitt</u>	<u>Attorney At Law</u>	<u>Grand Rapids, MI</u>	<u>(616) 459-4186</u>
<u>Gregory Peterson</u>	<u>Consultant</u>	<u>Ann Arbor, MI</u>	<u>(313) 973-8300</u>
			()
			()

17 ACCESS GAINED BY (Check one) <input checked="" type="checkbox"/> PERMISSION <input type="checkbox"/> WARRANT	18 TIME OF INSPECTION <u>2:00 pm</u>	19 WEATHER CONDITIONS <u>63°, Sunny</u>
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IV. INFORMATION AVAILABLE FROM

01 CONTACT <u>Galen Kilmer</u>	02 OF (Agency/Organization) <u>MDNR / GGD / Plainwell</u>	03 TELEPHONE NO. <u>(616) 685-9886</u>
04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM <u>George Carpenter / Cheryl Wallace</u>	05 AGENCY <u>GGD</u>	06 ORGANIZATION <u>MDNR</u>
07 TELEPHONE NO. <u>517-373-4800</u>	08 DATE <u>10.28.86</u> MONTH DAY YEAR	





POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE 02 SITE NUMBER
26

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 <input checked="" type="checkbox"/> A. GROUNDWATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED: <u>117,879</u>	02 <input checked="" type="checkbox"/> OBSERVED (DATE: <u>3/27/86</u>) 04 NARRATIVE DESCRIPTION <u>Samples taken from monitoring wells around landfill show PCBs in groundwater. Municipal wells potentially affected (see G)</u>	<input type="checkbox"/> POTENTIAL <input type="checkbox"/> ALLEGED
01 <input checked="" type="checkbox"/> B. SURFACE WATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED: <u>≈132,035</u>	02 <input checked="" type="checkbox"/> OBSERVED (DATE: <u>1985</u>) 04 NARRATIVE DESCRIPTION <u>Bryant Mill Pond (drawn down), Portage Creek, + Kalamazoo River water + sediments contaminated with PCBs. Portage Creek + Kalamazoo River are used for recreational purposes.</u>	<input type="checkbox"/> POTENTIAL <input type="checkbox"/> ALLEGED
01 <input type="checkbox"/> C. CONTAMINATION OF AIR 03 POPULATION POTENTIALLY AFFECTED: _____	02 <input type="checkbox"/> OBSERVED (DATE: _____) 04 NARRATIVE DESCRIPTION <u>N/A</u>	<input type="checkbox"/> POTENTIAL <input type="checkbox"/> ALLEGED
01 <input type="checkbox"/> D. FIRE/EXPLOSIVE CONDITIONS 03 POPULATION POTENTIALLY AFFECTED: _____	02 <input type="checkbox"/> OBSERVED (DATE: _____) 04 NARRATIVE DESCRIPTION <u>N/A</u>	<input type="checkbox"/> POTENTIAL <input type="checkbox"/> ALLEGED
01 <input checked="" type="checkbox"/> E. DIRECT CONTACT 03 POPULATION POTENTIALLY AFFECTED: <u>≈132,035</u>	02 <input checked="" type="checkbox"/> OBSERVED (DATE: <u>1985</u>) 04 NARRATIVE DESCRIPTION <u>Kalamazoo River + Portage Creek travel through densely populated areas of Michigan. Both are used for swimming, fishing, etc.</u>	<input type="checkbox"/> POTENTIAL <input type="checkbox"/> ALLEGED
01 <input type="checkbox"/> F. CONTAMINATION OF SOIL 03 AREA POTENTIALLY AFFECTED: _____ (ACR001)	02 <input type="checkbox"/> OBSERVED (DATE: _____) 04 NARRATIVE DESCRIPTION <u>N/A</u>	<input type="checkbox"/> POTENTIAL <input type="checkbox"/> ALLEGED
01 <input checked="" type="checkbox"/> G. DRINKING WATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED: <u>117,879</u>	02 <input type="checkbox"/> OBSERVED (DATE: _____) 04 NARRATIVE DESCRIPTION <u>Potential from migration of contaminated groundwater to municipal wells of cities of Kalamazoo + Portage</u>	<input checked="" type="checkbox"/> POTENTIAL <input type="checkbox"/> ALLEGED
01 <input type="checkbox"/> H. WORKER EXPOSURE/INJURY 03 WORKERS POTENTIALLY AFFECTED: _____	02 <input type="checkbox"/> OBSERVED (DATE: _____) 04 NARRATIVE DESCRIPTION <u>N/A</u>	<input type="checkbox"/> POTENTIAL <input type="checkbox"/> ALLEGED
01 <input checked="" type="checkbox"/> I. POPULATION EXPOSURE/INJURY 03 POPULATION POTENTIALLY AFFECTED: <u>≈132,035</u>	02 <input type="checkbox"/> OBSERVED (DATE: _____) 04 NARRATIVE DESCRIPTION <u>Potential from contact with contaminated surface waters + sediments and consuming contaminated fish as well as consuming contaminated groundwater</u>	<input checked="" type="checkbox"/> POTENTIAL <input type="checkbox"/> ALLEGED



POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE 02 SITE NUMBER
26

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

N/A

01 ☐ K. DAMAGE TO FAUNA
04 NARRATIVE DESCRIPTION (INCLUDE NAME(S) OF SPECIES)

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

N/A

01 ☒ L. CONTAMINATION OF FOOD CHAIN
04 NARRATIVE DESCRIPTION

02 ☒ OBSERVED (DATE: 1986)

☐ POTENTIAL

☐ ALLEGED

Fish advisory placed on Kalamazoo River. PCBs detected in carp + bass in Kalamazoo River.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES
(Spills/Runoff/Standing liquids, Leaking drums)

02 ☒ OBSERVED (DATE: 11-83)

☐ POTENTIAL

☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: 132,035 04 NARRATIVE DESCRIPTION

Contaminated sediments in Bryant Mill Pond + Kalamazoo River are loosely consolidated and appear highly erodible.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

N/A

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

N/A

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

N/A

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

Upstream bank + dry impoundment sediments continue to be eroded into the river system. Evidence to date indicates that much of the continuing contamination of the Kalamazoo River is originating from sediment deposits in Bryant Mill Pond + Portage Creek.

III. TOTAL POPULATION POTENTIALLY AFFECTED: 132,035

IV. COMMENTS

Bryant Mill Pond has been drawn since 1976 + dewatered contaminated sediments are exposed on the banks of the creek.

V. SOURCES OF INFORMATION (Cite specific references, e.g., MSDS, sample analysis reports)

MDNR Files - Groundwater + Surface Water Divisions
Site Inspection 10/25/86



POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE 02 SITE NUMBER
26

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
<input checked="" type="checkbox"/> A. NPDES	M10000779	2/85	2/90	
<input type="checkbox"/> B. UIC				
<input type="checkbox"/> C. AIR				
<input type="checkbox"/> D. RCRA				
<input type="checkbox"/> E. RCRA INTERIM STATUS				
<input type="checkbox"/> F. SPCC PLAN				
<input type="checkbox"/> G. STATE (Specify)				
<input type="checkbox"/> H. LOCAL (Specify)				
<input type="checkbox"/> I. OTHER (Specify)				
<input type="checkbox"/> J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE	04 TREATMENT (Check all that apply)	05 OTHER
<input type="checkbox"/> A. SURFACE IMPOUNDMENT			<input type="checkbox"/> A. INCINERATION	<input checked="" type="checkbox"/> A. BUILDINGS ON SITE
<input type="checkbox"/> B. PILES			<input type="checkbox"/> B. UNDERGROUND INJECTION	
<input type="checkbox"/> C. DRUMS, ABOVE GROUND			<input type="checkbox"/> C. CHEMICAL/PHYSICAL	
<input type="checkbox"/> D. TANK, ABOVE GROUND			<input type="checkbox"/> D. BIOLOGICAL	
<input type="checkbox"/> E. TANK, BELOW GROUND			<input type="checkbox"/> E. WASTE OIL PROCESSING	
<input checked="" type="checkbox"/> F. LANDFILL	7952	yds ³	<input type="checkbox"/> F. SOLVENT RECOVERY	06 AREA OF SITE
<input type="checkbox"/> G. LANDFARM			<input type="checkbox"/> G. OTHER RECYCLING/RECOVERY	
<input type="checkbox"/> H. OPEN DUMP			<input type="checkbox"/> H. OTHER (Specify)	<u>≈ 6400</u> (Acres)
<input checked="" type="checkbox"/> I. OTHER Contam. Sediment (Specify)	≈ 114	tons		

07 COMMENTS

80 miles $\left(\frac{5280 \text{ Ft}}{\text{mile}} \right) (660 \text{ Ft}) \left(\frac{0.000022957 \text{ acres}}{\text{Ft}^2} \right) = 6400 \text{ acres}$

80 miles = from city of Kalamazoo to Saugatuck

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ☒ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☒ YES ☐ NO

02 COMMENTS

Landfill waste not easily accessible. River + Creek easily accessible

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analyses, reports)

MDNR Files - Groundwater + Surface Water Divisions
Site Inspection - 10/28/86



POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
26

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY
(Check as applicable)

SURFACE WELL
COMMUNITY A. ☐ B. ☒
NON-COMMUNITY C. ☐ D. ☒

02 STATUS

ENDANGERED AFFECTED MONITORED
A. ☒ B. ☐ C. ☐
D. ☒ E. ☐ F. ☐

03 DISTANCE TO SITE

A. 2000 (mi) Ft
B. 2 (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☒ B. DRINKING
(Other sources available)
COMMERCIAL, INDUSTRIAL IRRIGATION
(No other water sources available)
☐ C. COMMERCIAL, INDUSTRIAL IRRIGATION
(Limited other sources available)
☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 117,879

03 DISTANCE TO NEAREST DRINKING WATER WELL 2000 (mi) Ft

04 DEPTH TO GROUNDWATER

17 (m)

05 DIRECTION OF GROUNDWATER FLOW

Northwest

06 DEPTH TO AQUIFER
OF CONCERN

300 (m)

07 POTENTIAL YIELD
OF AQUIFER

unk (gpd)

08 SOLE SOURCE AQUIFER

☐ YES ☒ NO

09 DESCRIPTION OF WELLS (including usage, depth, and location relative to population and buildings)

Depth to aquifer is from lands surface to 300 ft in the city of Kalamazoo.
The municipal wells serve the entire city of Kalamazoo.

10 RECHARGE AREA

☐ YES COMMENTS
☒ NO

11 DISCHARGE AREA

☒ YES COMMENTS Groundwater probably dis-
charges to Kalamazoo River + Portage Creek
☐ NO

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☐ A. RESERVOIR, RECREATION
DRINKING WATER SOURCE ☒ B. IRRIGATION, ECONOMICALLY
IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:

AFFECTED

DISTANCE TO SITE

Portage Creek

☒

on-site (mi)

Kalamazoo River

☒

on-site (mi)

☐

(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE

A. 4165
NO. OF PERSONS

TWO (2) MILES OF SITE

B. 52,483
NO. OF PERSONS

THREE (3) MILES OF SITE

C. 117,879
NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION

200 Ft (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE

Numerous

04 DISTANCE TO NEAREST OFF-SITE BUILDING

200 Ft (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

The site extends from the city of Kalamazoo to Saugatuck (80 miles).
Population ranges from rural areas to densely populated urban areas.



POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
26

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-8} - 10^{-6}$ cm/sec ☐ B. $10^{-4} - 10^{-6}$ cm/sec ☒ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

Sand with clay

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-8} cm/sec) ☒ B. RELATIVELY IMPERMEABLE ($10^{-8} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-6} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-4} cm/sec)

03 DEPTH TO BEDROCK

150-200 (ft)

04 DEPTH OF CONTAMINATED SOIL ZONE

N/A (ft)

05 SOIL pH

N/A

06 NET PRECIPITATION

1.75-3.76 (in)

07 ONE YEAR 24 HOUR RAINFALL

2 (in)

08 SLOPE

SITE SLOPE

< 3 %

DIRECTION OF SITE SLOPE

Northwest

TERRAIN AVERAGE SLOPE

< 3 %

09 FLOOD POTENTIAL

River + Creek

SITE IS IN 100 YEAR FLOODPLAIN

10

☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

N/A

11 DISTANCE TO WETLANDS (5 core minimum)

ESTUARINE

OTHER

A. N/A (mi)

B. adjacent (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

N/A (mi)

ENDANGERED SPECIES: no endangered species

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL

RESIDENTIAL AREAS: NATIONAL/STATE PARKS,
FORESTS, OR WILDLIFE RESERVES

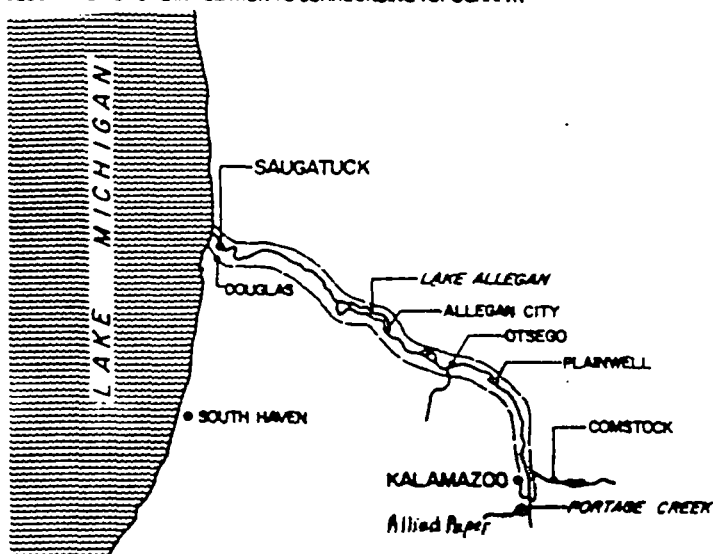
AGRICULTURAL LANDS
PRIME AG LAND AG LAND

A. ~ 1000 (mi) Ft

B. ~ 400 (mi) Ft

C. N/A (mi) D. N/A (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY



- See attachment
for more detailed
description.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., data files, sample analyses, reports)

MDNR Files - Groundwater & Surface Water Divisions
Hydrogeologic Investigation For Allied Paper, Inc.
U.S. Geological Survey

Evidence of a direct release to surface water is presented in Reference 12, page 44, where a release of 69 ng/L total PCBs from the Allied wastewater treatment plant has been documented. Allied acknowledges that releases have occurred and that PCBs have been deposited in Bryant Mill Pond sediments (Ref. 11). Extensive sediment sampling has documented the PCB contamination of Bryant Mill Pond, Portage Creek, and Kalamazoo River through Lake Allegan (Ref. 12, Appendix B; Ref. 17; Ref. 24). This contamination, ranging up to 1000 ppm in Bryant Mill Pond (Ref. 17) significantly exceeds the background values for sediments upstream of Bryant Mill Pond in Monarch Pond (averaging less than 1 ppm, Ref. 12, Appendix B, page 188) and the value for sediments in Morrow Pond in the Kalamazoo River upstream of its confluence with Portage Creek (averaging less than 1 ppm, Ref. 14, Ref. 17). Water samples also show a consistent pattern, with no PCBs detected above Bryant Mill Pond in the water column (Ref. 28).

The discharge of PCBs from Bryant Mill Pond to Portage Creek has been determined, on average, to be approximately 140 ng/L (Ref. 12, Table 14, p. 60). This demonstrates that there must be a continuous release of PCBs from Bryant Mill Pond sediments because the PCB concentration in surface waters at the pond discharge to Portage Creek is greater than that in the Allied discharge (see above), and the level of PCBs in sediment upstream of Bryant Mill Pond are relatively insignificant (Ref. 12, p. 188).

Evidence that historical releases to surface waters have occurred is presented in Attachment 4 of Reference 6. These sediment core data from Bryant Mill Pond show that the contamination is not restricted to the near surface sediments but extends two to seven feet into the deeper sediments (Ref. 6; Ref. 24, Ref. 17, pp. 1-3).

Further evidence that the releases to Bryant Mill pond were from Allied come from sediment sampling in Portage Creek upstream of Bryant Mill Pond. Samples taken 6600 and 6900 feet upstream from Bryant Dam revealed 0.04 mg/kg of PCBs (Ref. 12, Appendix B, page 188), while levels in the pond are as high as 1000 mg/kg (Ref. 6, Attachment 4; Ref. 17). Therefore, PCB releases to surface waters must have occurred at Bryant Mill Pond. Erosion of PCB laden sediments has occurred and is estimated to constitute a major source of contamination to the Portage Creek system (Ref. 13, Ref. 17, p. 2).

As shown in Reference 14, sediment samples from Morrow Pond (a Kalamazoo River impoundment upstream of the confluence with Portage Creek) averaged less than 1 mg/kg (two of 33 samples contained 4.1 and 4.9 mg/kg). This isolates and identifies Bryant Mill Pond as a major source of PCBs to the Kalamazoo River system.

Substantial PCB contamination has been detected throughout the Portage Creek/Kalamazoo River system below Bryant Mill Pond. The sediment burden data are summarized in the attached table on page 6B. Data collected from

QA
John Miller
3-27-89

1982 through 1988 are combined to show a consistent distribution pattern of PCBs with high concentrations in Bryant Mill Pond sediments. While concentrations decrease in downstream areas, they are significant as far downstream as Lake Allegan. As in Bryant Mill Pond, downstream sediment core data (Ref. 12, pp. 51-52) show that the contamination is not restricted to the near surface sediments but extends six to eight feet in the sediment. This indicates that long-term release and deposition has occurred and that there has been ample time for resuspension and downstream transport of contaminated sediments.

Average PCB Concentrations (in mg/kg) Found in Surface Sediment Samples from 1982 through 1986, Reference 12, Table 11.

River Region ^a	Year	1982	1983	1984	1985	1986
1			^b 191.4 (9)	226.8 (4)	183.0 (6)	189.6 (15)
2		85.0 (1)	12.6 (4)			
3		36.2 (4)		13.0 (1)		
4		8.8 (2)	19.9 (5)			
5					16.5 (2)	
6		27.0 (1)				
7			28.9 (7)			
8					5.0 (2)	
9			16.6 (5)			

- ^a River Region 1 = Bryant Mill Pond
River Region 2 = Portage Creek
River Region 3 = Portage Creek to City of Plainwell
River Region 4 = Former Plainwell Impoundment
River Region 5 = Plainwell Dam to City of Otsego
River Region 6 = Former Otsego Dam Impoundment
River Region 7 = Otsego Dam to Trowbridge Dam (includes former Trowbridge Dam impoundment)
River Region 8 = Trowbridge Dam to City of Allegan Dam
River Region 9 = Lake Allegan

^b average concentration based on (number of samples)

GA
John Miller
3-27-89

Allied Paper Co. was a major recycler of high quality papers (Ref. 15, p. 9), generally classified as ledger paper, which included carbonless copy paper, and was a leader in recycling waste paper (Ref. 11, p. 1) and a recognized authority in the deinking process (Ref. 15, pp. 8, 14). Another mill discharging to the Kalamazoo River did not deink its recycled wastepaper (Ref. 15, p. 16) while other mills had difficulty obtaining the carbonless copy paper because Allied excluded them from the high grade paper market (Ref. 16), which included significant amounts of NCR paper. PCBs were used in NCR carbonless paper (Ref. 11, p. 1; Ref. 15, pp. 9 - 11) and as a result of the recycling and deinking processes undertaken at Allied, PCBs have contaminated the river system. Generally absent from Bryant Mill Pond, Portage Creek, and Kalamazoo River sediments are the higher arochlor species (such as arochlor 1260) typical of transformer or electrical applications (Ref. 12, pp. 182-186). The PCBs present in sediments from the site are dominated by Arochlor 1242 and, to a lesser extent, Arochlor 1254 (Ref. 12, pp. 182-186).

Further evidence that downstream contamination is coming from Allied and Bryant Mill Pond is provided by sediment characterization data (Ref. 17, p. 2). Bryant Mill Pond sediments containing PCBs were characterized as a grey, silty, clayey, sludge-like material and this same characterization was made for PCB bearing sediments in all the downstream impoundment areas. (Ref. 17, p. 2).

There are other dischargers of PCBs to the Kalamazoo River system (Ref. 12, p. 44; Ref. 21). However, with the exception of the City of Otsego waste water treatment plant (WWTP), PCB concentrations in these discharges are generally less than in the Allied discharge, based on the 9/6/85 sampling event. The water supply for several of these systems is the Kalamazoo River either by direct intake or wells near the River. It is therefore probable that the River is the source of some of the PCBs in their discharges. It is also probable that Allied is one of the PCB sources to the Kalamazoo WWTP because some process water is discharged to the Kalamazoo sanitary sewer (Ref. 4, p. 2). The James River Corporation mill at Parchment appears to have been only a minor discharger to the River. Recent discharge data indicate that PCBs are no longer being discharged to the River and that monitoring well and soil or sludge data around the mill's landfill area show little or no PCB contamination (Ref. 19). Similarly, recent reviews of the Plainwell Paper Co. in Plainwell and the Rock-Ten Mill (Formerly Mead Otsego) in Otsego indicate that these facilities are not a source of PCBs to the river and would not require water quality-based effluent limits for PCB (Ref. 20). If any of these facilities are to be considered PCB sources in the past, they are likely not to have been dischargers on a scale comparable to Allied.

QA -
John K. Miller
3-22-89

In summary, Allied is the source of PCB contamination in Bryant Mill Pond. Resuspension and transport of sediments contaminated with PCB has resulted in the contamination of Portage Creek and the Kalamazoo River at least to the extent of Lake Allegan. Allied is suspected as the principal source of contamination of downstream sediments because of the high PCB concentrations present in Bryant Mill Pond, the pattern of contamination in downstream sediments, the lack of any other identified dischargers which could have contributed PCBs to the extent of Allied, the characterization of the downstream sediments which are similar to those found in Bryant Mill Pond, and the amount of business Allied Paper did in deinking and recycling carbonless copy paper, the main source of PCBs, relative to other mills in the area.

QA
John K Miller
3-27-89

Rationale for attributing contaminants to the facility:

Monitor wells sampled by the Michigan Department of Natural Resources show the following results:

	Background wells		Contaminated wells	
	1	2	3	5
Arochlor 1242	ND ¹	ND ¹	0.520 ²	0.490 ³
Arochlor 1254	ND ¹	ND ¹	ND ⁴	0.067 ³

(concentrations expressed as parts per billion)

- ¹ Detection limit 0.100 ppb (INT K.1)
- ² Detection limit 0.010 ppb
- ³ Detection limit 0.050 ppb
- ⁴ Detection limit 0.200 ppb (INT K.2)

(Ref. 1)

Allied Paper Company was a major recycler of high quality papers (Ref. 15, p. 9) and a recognized authority in the deinking process (Ref. 15, p. 8). Recycling of NCR carbonless copy paper, which contained PCBs (Ref. 15, pp. 9 - 11), resulted in the discharge of Arochlor 1242 and Arochlor 1254 to the environment. Bryant Mill Pond has become contaminated with PCBs at concentrations as high as 1000 mg/kg (Ref. 6, Attachment 4, sample 12-2). Seeps from the onsite landfill also showed the presence of PCB at significant concentrations (Ref. 12, Appendix B, p. 188; Ref. 23). Logs of the monitor wells referenced above which were installed at Allied Paper can be found in Reference 4.

QA
John K Miller
3-27-89

DESCRIPTION OF THE AQUIFER

The aquifer of concern is the Glacial Drift aquifer of the Kalamazoo, Michigan area. In the area surrounding Allied Paper, the glacial drift aquifer consists of unconsolidated morainal, outwash, or channel deposits. Morainal deposits are tills deposited directly from the overlying glaciers; water did not generally play a part in the depositional process. Outwash deposits were laid down from meltwater streams issuing from the glacial ice. Channel deposits are very similar to outwash deposits, except they have been eroded and reworked by streams and rivers, and are often covered with a layer of finer grained deposits (Ref. 3 pp. 25-27). The aquifers which are most capable of supplying significant quantities of water are in areas of outwash or channel deposits. Allied is located in an area of channel deposits which are approximately 100 to 200 feet thick (Ref. 3, pp. 26-28).

Aquifers in the Kalamazoo area are recharged by infiltration of rainfall, snowmelt, and surface waters induced by pumping near surface sources, although recharge from streams can be impeded locally by high sedimentation rates and siltation. (Ref. 3, p.1). Most of the well fields in Kalamazoo are adjacent to creeks which are tributary to the Kalamazoo River. The municipality has conducted a program of inducing recharge to some of the aquifers by the construction of recharge ponds and channels, and by streambed improvement. As an example, three ponds on Axtell Creek were created as recharge for the well field in that area (Ref. 3, p. 37, Fig. 15). This area is located approximately 1/2 mile to the northwest of Allied Paper. A similar program was initiated on the west fork of Portage Creek, just upstream of Bryant Mill Pond. A recharge channel was dredged and a portion of the flow diverted from the creek. Figure 9 of Reference 3 illustrates surface recharge to the water table aquifer and then to the producing zone through a layer of relatively lower permeability. Leakage through this layer is apparent from aquifer tests and comparisons of pumpage rates and flow volumes in Axtell Creek (Ref. 3, p. 38). The flow in Axtell Creek is diminished considerably during periods of high pumping rates in that area.

In addition, well logs from the area demonstrate the homogeneous nature of the unconsolidated sediments in the glacial drift aquifer. Log 2S 11W 27-1 (numbering refers to range, township, and section in which the well is located) shows sand and gravel to a depth of 191 feet beneath a three foot layer of surface muck (Ref. 3, p. 109). The log of well 2S 11W 22-94 indicates 211 feet of sand and gravel, with a one foot layer of clay (Ref. 3, p. 106). Thus, the absence of a confining layer and the demonstrated recharge of the aquifer from the surface indicates that the water table encountered by the monitor wells is in hydraulic connection with the municipal water supply, and that the observed release is occurring in the aquifer of concern.

QA
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Is there tidal influence?

no

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

N/A

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Less than 100 feet. Numerous wetland areas exist along Portage Creek and the Kalamazoo River. Note especially the extensive marshes near Otsego and Trowbridge (Ref. 27). In addition, Koopman Marsh, which covers more than 640 acres, is located approximately 1000 feet downstream of the Lake Allegan dam (Ref. 27).

HRS Score = 3

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

There are no endangered species in the project area.

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

There are no surface water intakes for potable water supplies. However, several municipalities have located water wells near Portage Creek and the Kalamazoo River. As discussed in the Ground Water Route, these waters are considered to be in hydraulic connection with ground water supplies. The population thus served is not considered for this pathway. ~~However~~.

Although there are indications that the Kalamazoo River is used as a source of irrigation water for corn and soybean crops, the exact location of the intakes could not be verified, and as a result these targets are not included in the HRS score. (Ref. 25)

HRS score = 0

QA
John Kriller
3-27-89